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IS 10096-1-2 (1986): Recommendations for inspection, testing and maintenance of radial gates and rope drum hoists, Part 1: Inspection, testing and assembly at the manufacturing stage, Section 2: Rope Drum Hoists [WRD 12: Hydraulic Gates and Valves]



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“Knowledge is such a treasure which cannot be stolen”

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IS : 10096 (Part 1/Sec 2) - 1986

(Reaffirmed 2000)

Edition 1.1

(1993-02)

Indian Standard

**RECOMMENDATIONS FOR
INSPECTION, TESTING AND MAINTENANCE
OF RADIAL GATES AND ROPE DRUM HOISTS**

**PART 1 INSPECTION, TESTING AND ASSEMBLY AT THE
MANUFACTURE STAGE**

Section 2 Rope Drum Hoists

(Incorporating Amendment No. 1)

UDC 621.876 : 626.422.23 : 620.1

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BUREAU OF INDIAN STANDARDS
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Price Group 2

Indian Standard

RECOMMENDATIONS FOR
INSPECTION, TESTING AND MAINTENANCE
OF RADIAL GATES AND ROPE DRUM HOISTS

PART 1 INSPECTION, TESTING AND ASSEMBLY AT THE
MANUFACTURE STAGE

Section 2 Rope Drum Hoists

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Indian Standard

RECOMMENDATIONS FOR
INSPECTION, TESTING AND MAINTENANCE
OF RADIAL GATES AND ROPE DRUM HOISTS

PART 1 INSPECTION, TESTING AND ASSEMBLY AT THE
MANUFACTURE STAGE

Section 2 Rope Drum Hoists

0. F O R E W O R D

0.1 This Indian Standard (Part 1/Sec 2) was adopted by the Indian Standards Institution on 31 July 1986, after the draft finalized by the Hydraulic Gates and Valves Sectional Committee had been approved by the Civil Engineering Division Council.

0.2 Hoists are very important so far as the operation of the gates are concerned but one redeeming feature is that the hoists are always approachable since they are above water. Before the floods, the hoist should also be checked carefully.

0.3 Reference to the following Indian Standards will be found useful in the implementation of this standard:

IS : 210-1978	Grey iron castings (<i>third revision</i>)
IS : 226-1975	Structural steel (standard quality) (<i>fifth revision</i>)
IS : 306-1983	Tin bronze ingots and castings (<i>third revision</i>)
IS : 318-1981	Leaded tin bronze ingots and castings (<i>second revision</i>)
IS : 816-1969	Code of practice for use of metal arc welding for general construction in mild steel (<i>first revision</i>)
IS : 1030-1982	Carbon steel castings for general engineering purposes (<i>third revision</i>)
IS : 2004-1978	Carbon steel castings for general engineering purposes (<i>second revision</i>)
IS : 2062-1984	Weldable structural steel (<i>third revision</i>)
IS : 2595-1978	Code of practice for radiographic testing (<i>first revision</i>)

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- IS : 3664-1981 Code of practice for ultrasonic pulse echo testing by contact and immersion methods (*first revision*)
- IS : 3973-1967 Code of practice for the selection, installation and maintenance of wire ropes
- IS : 5530-1969 Code of procedure for repair and rectification of steel castings by metal arc welding process

0.4 This edition 1.1 incorporates Amendment No. 1 (February 1993). Side bar indicates modification of the text as the result of incorporation of the amendment.

1. SCOPE

1.1 This standard (Part 1/Sec 2) lays down the recommendations for inspection, testing and assembly of rope drum hoists for radial gates at the manufacturing stage.

1.2 This standard may be applicable for rope drum hoists for other types of gates as well.

2. GENERAL

2.1 All materials and components used for the work shall be new and free from defects and subject to the specified tolerances.

2.2 Complete inspection of the hoists shall be made at the place of manufacture prior to despatch.

2.3 At least one hoist shall be fully assembled and tested under no load condition at the shop. If specified by the purchaser, at least one hoist assembly is to be tested for designed forces coming on the rope drum corresponding to 125 percent of the hoist capacity.

3. MATERIALS

3.1 All materials and components supplied by the manufacturer shall conform to the requirements of the latest relevant Indian Standards. In the absence of any Indian Standard for any particular material or component, other specification, as mutually agreed to between the purchaser and the supplier, may be used.

3.2 All materials used shall be of tested quality and original manufacturer's test certificates for bought out items like castings, forgings, worm reducers, wire ropes, motors and brakes, etc, shall be furnished by the hoist manufacturer on demand.

3.3 Castings — All castings shall conform to relevant Indian Standards.

3.3.1 Visual examination should be done to find out the general soundness of castings and if required, these may be subjected to non-destructive tests.

3.3.2 Repairs to defects shall be carried out in accordance with relevant Indian Standards. Repairs to the permissible defects may be allowed ensuring the strength of castings.

3.4 Forgings — All forgings shall conform to relevant Indian Standards.

3.4.1 All forgings shall be suitably heat treated where deemed essential.

3.4.2 Finished surfaces of all forgings shall be smooth and free from tool marks.

4. HOIST UNIT OF GATE

4.1 Components of hoist as given below shall be inspected:

- a) Drive unit consisting of gear box, motor, brake, all mounted on a base frame;
- b) Hoist drum and gear reduction unit mounted on a base frame and connected to drive unit by line shafts, limit switches and dial indicators;
- c) Hoist ropes, rope fixtures with accessories;
- d) Arrangement for manual operation of gate;
- e) Control panel; and
- f) Any other component.

4.1.1 Drive Unit Gear Box — It shall be checked for proper sealing arrangement of the shafts and oil in gear box.

4.1.2 Hoist Motor — It shall be of approved manufacture, capacity, insulation and speed (rpm). It shall conform to IS : 325-1978* unless otherwise specified and shall be checked at manufacturer's premises. Manufacturer's test certificate shall be furnished for motor.

4.1.3 Brake — It shall be of approved manufacture and capacity. It shall be checked for alignment and tightness. Brake liners shall be of approved manufacture and shall conform to approved specification.

4.1.4 Base Frame — The base frame for mounting of drive unit/gear reduction unit with hoist drum shall be checked for dimensional accuracy.

4.1.5 Hoist Drum — It shall be checked for dimensional accuracy. Cast iron/cast steel drums shall be checked for blow holes, cracks, etc, specially at groove centres. Fabricated drums shall be checked for stress-relieving in approved manner. Rope grooves shall be checked for orientation. Arrangement of rope attachment to the drum shall be checked for securing.

*Specification for three-phase induction motors (*fourth revision*).

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4.1.6 Reduction Unit Gear Box — It shall be checked for proper assembly, dimensional accuracy, sealing, finish of machined parts, and surface preparation and painting. Gears, pinions and other internals shall be checked for alignment. Meshing of gear and pinion teeth shall be checked for alignment. It shall also be checked for contact surface and backlash by suitable methods such as applying a thin film of paint or grease on either the pinion or gear wheel and running the assembly and noting the impression. Gears and pinions shall be checked for hardness. Tolerances of gears and pinions shall conform to IS : 919-1963* and backlash shall conform to IS : 4460-1967‡.

4.1.7 Line Shaft — It shall be checked for straightness and other dimensions. The straightness shall be in accordance with relevant Indian Standard. Mounting of couplings on line shafts shall be checked for alignment.

4.1.8 Limit Switch — It shall be checked for satisfactory operation. It shall be weatherproof.

4.1.9 Dial Indicator — It shall be checked for satisfactory operation and accuracy.

4.1.10 Hoist Ropes — It shall be of approved manufacture and shall conform to relevant Indian Standards. The ropes shall be checked for diameter, length, freedom from twists and kinks, proper thimble end connections and splicing. If the ropes are of galvanized type, galvanization shall be in accordance with Class II of IS : 1573-1970‡. Manufacturer's test certificate shall be furnished for hoist ropes.

4.1.11 Rope Fixtures — It shall be checked for dimensional accuracy and their correctness.

4.1.12 Arrangement for Manual Operation of Gates — It shall be checked for satisfactory operation. It shall be ensured that the gates are kept at required position during their travel for specified speed as envisaged in the design.

4.1.13 Control Panel — Panels shall be checked for their suitability for the purpose envisaged. The checks may include items such as weather-proofing of conducting wires. If specified, proper construction of panels, high voltage test, insulation resistance of cable, calibration of meters, if any and checking of connections shall be done.

*Recommendations for limits and fits for engineering.

‡Method for rating of machine cut spur and helical gears.

‡Specification for electroplated coatings of zinc on iron and steel (*first revision*).

5. LUBRICATION OF GEARS AND BEARINGS

5.1 For gears and pinions, lubricating oil/grease or lubricating compound used shall be of approved grade and quality.

5.2 Bearings closed from outside and open from inside shall be checked for splash lubrication and bearing covers shall be free from leakage. For bearings closed from both sides, proper injection of grease of approved quality and grade shall be checked.

6. INSPECTION ON ASSEMBLY

6.1 The assembled hoist shall be checked for the following:

- a) Quality of workmanship,
- b) Overall dimensions,
- c) Optimum sound and vibrations,
- d) Speed of operation allowing for variation in accordance with Indian Standards, and
- e) Any mechanical jamming.

7. PAINTING

7.1 Painting of different components of hoist shall be according to relevant Indian Standards.

INTERNATIONAL SYSTEM OF UNITS (SI UNITS)

Base Units

QUANTITY	UNIT	SYMBOL
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

Supplementary Units

QUANTITY	UNIT	SYMBOL
Plane angle	radian	rad
Solid angle	steradian	sr

Derived Units

QUANTITY	UNIT	SYMBOL	DEFINITION
Force	newton	N	1 N = 1kg.m/s ²
Energy	joule	J	1 J = 1 N.m
Power	watt	W	1 W = 1 J/s
Flux	weber	Wb	1 Wb = 1 V.s
Flux density	tesla	T	1 T = 1 Wb/m ²
Frequency	hertz	Hz	1 Hz = 1 c/s (s ⁻¹)
Electric conductance	siemens	S	1 S = 1 A/V
Electromotive force	volt	V	1 V = 1 W/A
Pressure, stress	pascal	Pa	1 Pa = 1 N/m ²

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This Indian Standard has been developed by Technical Committee : BDC 56 and amended by RVD 12

Amendments Issued Since Publication

Amend No.	Date of Issue
Amd. No. 1	February 1993

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